

Definition of Logarithms; Laws of Logarithms

Simplify each logarithm.

1. $\log_6 36$ _____

3. $\log_3 \frac{1}{9}$ _____

5. $\log_{\frac{1}{2}} 4$ _____

7. $\log_{10} 0.001$ _____

2. $\log_2 128$ _____

4. $\log_5 1$ _____

6. $\log_8 4$ _____

8. $\log_{\sqrt{3}} \frac{1}{27}$ _____

Solve.

9. $\log_8 x = 3$ _____

11. $\log_{\sqrt{3}} 9 = x$ _____

13. $\log_x \frac{1}{16} = -8$ _____

10. $\log_x \frac{1}{64} = -3$ _____

12. $\log_{\frac{1}{8}} x = -\frac{4}{3}$ _____

14. $\log_{\frac{1}{10}} 10,000 = x$ _____

Express each logarithm in terms of $\log_3 M$ and $\log_3 N$.

15. $\log_3 MN^2$ _____

17. $\log_3 \frac{M^2}{N}$ _____

16. $\log_3 \sqrt{MN}$ _____

18. $\log_3 \sqrt{\frac{M}{N^2}}$ _____

Express as a single logarithm.

19. $\log_3 d - \log_3 i + \log_3 k - \log_3 n$ _____

21. $2 \log_2 m + \frac{1}{2} \log_2 n$ _____

20. $3 - \log_3 r$ _____

22. $\log \frac{a}{b} - 2 \log \frac{a}{b}$ _____